

ABSTRACT

“ROLE OF EXTENDED FAST IN ASSESSING VISCERAL INJURIES IN BLUNT ABDOMINAL TRAUMA”

BACKGROUND

Pneumothorax is a common clinical condition affecting significant number of patients with polytrauma. Incidence of pneumothorax is increasing as high as 20%. Small or medium may not be life threatening, but tension pneumothorax of ten preceded by small or medium pneumothorax may lead to cardiac arrest. So early identification of pneumothorax is crucial to reduce the progression to tension pneumothorax and reduce the mortality and morbidity in critically injured patients. The primary FAST examination classically includes the subxiphoid window of the heart to injury to the peritoneal and pleural cavities. Although FAST was defined by international consensus as “ an examination to detect free intraperitoneal fluid as a marker of injury”, the role of FAST has been extended to the diagnosis of hemopericardium and lately to pneumothorax. Thoracic ultrasound has shown promise in inferring the presence of post traumatic pneumothoraces and may have a particular value in identifying occult pneumothoraces missed by AP supine chest radiography.

AIMS AND OBJECTIVES OF THE STUDY

The aim of FAST and eFAST is to determine whether one or more of the abdominal, pericardial or pleural cavity has hemoperitoneum, hemopericardium, hemothorax and pneumothorax or not, that may indicate breach in the integrity of the cavity and potentially significant injury.

The objective of the study:

To assess the accuracy of sonography to detect free intra-peritoneal fluid , fluid in pericardium and detection of hemothorax and pneumothorax as a part of extended focused assessment with sonography in trauma .

Early identification of pneumothorax to reduce the progression to tension pneumothorax and thereby reducing the mortality in critically injured patients.

MATERIALS AND METHODS

SAMPLE COLLECTION:

Inclusion criteria

1. Patient above the age of 12 yrs.
2. All patients with blunt abdominal trauma and blunt chest trauma.
3. Pregnant patients.

Exclusion criteria

1. Patient with penetrating injury.
2. Psychiatric patients.
3. Paediatric patients.

Source of study:

Data consist of primary data that is collected directly from the patients admitted with the history of blunt abdomen and chest trauma in Coimbatore medical college and hospital, Coimbatore.

Design of study:

Prospective observational study.

Period of study:

One year : July 2017 to June 2018.

METHODOLOGY:

This is a prospective observational study of a patient admitted with history of blunt trauma at our trauma center in Coimbatore medical college hospital , Coimbatore, starting from the month of July 2017 to June 2018 . After admission proper history was taken and the patient underwent chest radiograph and CT scan for whom it was indicated and possible, and FAST

and eFAST was performed in all patients with history of blunt trauma either chest or abdomen, for the purpose of inferring the presence or absence of pneumothoraces in addition to the standard FAST examination. FAST and Extended FAST was performed as part of 24 hours service with the help of an experienced radiologist at Coimbatore Medical College Hospital. The regular FAST protocol was performed as the first examination followed by sonographic pneumothorax detection. This scanning sequence, which include FAST followed by sonographic pneumothorax detection is named as eFAST i.e Extended FAST. The eFAST examination was performed with the same transducer wherein we decrease the scan depth and approximate the focus to pleura. The scan was performed on two sites on each lung. One between the second and fourth intercostal space at midclavicular line and sixth to eighth space in midaxillary line. Normal pleural interface was identified on sonography mainly by the presence of 'lung sliding' which is seen as a to -and - fro movements of the viscera and the parietal pleura during normal breathing, and the other is the presence of 'comet tail' artifacts due to hyperechoic reverberations extending from the pleura down to the lung. Absence of both the signs were diagnostic of pneumothorax.

The eFAST evaluation was performed blind to both the chest radiography and chest CT. For unstable patient, for whom CT scan was not possible, further intervention was made only by chest radiography and

eFAST or only by eFAST alone. For all those patients who show negative result with eFAST scan was subjected to serial follow up or CT depending upon the clinical scenario. The result of eFAST and chest radiography was compared later on to chest CT findings .

RESULTS

The basis of using ultrasonography to detect the presence or absence of pneumothorax comes from the fact that

- a) If two pleura surfaces that is the visceral and the parietal pleura are confirmed to be in apposition, then by definition an intrapleural collection of air cannot separate these two surfaces. For this sliding and gliding movement of the pleural surface against each other in ultrasonography both the surface of the pleura must be either contiguous or separated by fluid.
- b) The comet tail artifact are reverberation artifacts that arises from the distended water filled interlobular septa surrounded by air in the visceral pleura.

Therefore, lung sliding and comet tail artifact will be absent in patients with pneumothorax

Utilizing these principles, eFAST has proved to be a rapid and useful imaging modality to detect pneumothoraces. When compared with CT scan, eFAST show an overall greater accuracy to detect pneumothorax than the chest x ray.

This prospective observational study was conducted among 208 patients with the history of blunt injury abdomen admitted in trauma center in Coimbatore medical college hospital from the year of July 2017 to June 2018 i.e in one year duration period.

Out of 208 patients, 163 were males (78%) and 45 were females (22%)

Among the 208 patients that was included in the study, greater number belongs to the age group between 21 to 40 years making a total of 42%. Age group between 41 to 60 years include 82 patients i.e about 39%, more than 60 years include 21 patients i.e about 10% and patients with least number belong to the age group of less than 20 years which included 18 patients making a total of 9% of the total patients. Out of the total 208 patients, hemoperitoneum using FAST was detected in 109 patients whereas pneumoperitoneum was present in 15 patients. Of these total patients, visceral injuries was found in 121 patients. Number of Liver injury cases was reported in 34 patients, Spleen injury in 54 patients, Bladder injury in 12 patients and Kidney injury in 21 cases. There were 4 cases of pancreatic injury and 10 cases of bowel injury that was missed in sonography and was

reported in CT scan. 10 cases of bowel injury patients only showed pneumoperitoneum with FAST but bowel injury as such could not be detected.

Out of the visceral organ involved in blunt abdominal trauma , it was found that spleen is the most predominant organ to be involved accounting for about 26% (54 out of 208), followed by liver 16% (34 out of 208) of all the other organ involved.

By keeping CT scan as the gold standard for detecting hemothorax and pneumothorax , it was found that number of pneumothorax reported in CT scan was 53 and with eFAST 48 patients was diagnosed to have pneumothorax.

It was found that the sensitivity to detect pneumothorax by eFAST is 84.91% and specificity is 98.06% , positive predictive value is 93.75% , negative predictive value is 95.00% and accuracy of 94.71%.

Hence considering CT scan as a gold standard to detect pneumothorax, it was found that eFAST holds next best diagnostic tool to diagnose pneumothorax after CT scan in case of blunt trauma. But eFAST is best for patients who are hemodynamically unstable for need of early intervention .

CONCLUSION

Ultrasound can be considered as initial imaging modality in evaluation of blunt abdominal trauma. The use of ultrasound in trauma scenario is now widely used and accepted. FAST is non invasive, readily available non ionizing and requires minimal preparation time.

The ultrasound examination in trauma room has to be brief and focused to the presence of hemoperitoneum, hemopericardium and hemothorax or pneumothorax. This enables us to perform a better triage whether dealing with an individual trauma patient or multicasualty incident thereby improving the patient prognosis, reducing the morbidity and mortality.

Because there is no ionizing radiation that is involved with ultrasound, FAST can be performed consecutively and can spare the patient from CT scan, especially when dealing with pediatric trauma patients or a pregnant lady and those who are hemodynamically unstable.

Repeated ultrasonography in patients with blunt abdominal trauma and close clinical observation increases the sensitivity of ultrasonography to nearly 100% .

KEYWORDS

FAST, eFAST, Blunt trauma, Thoracic ultrasound, Pulmonary ultrasound.